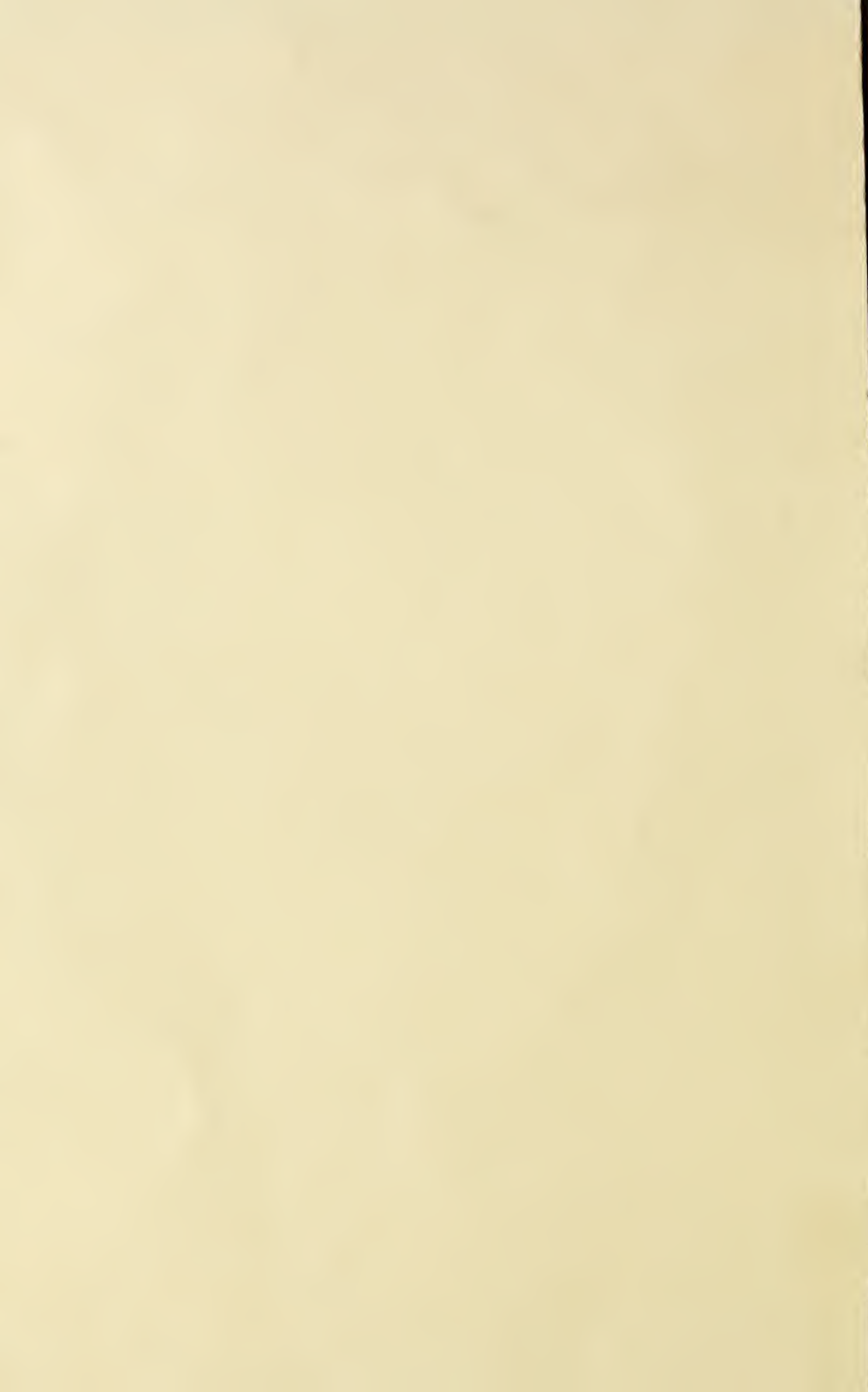


Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.



The Agricultural Student.

Published monthly by

The Agricultural Student Publishing Co.

TERMS.

One Year,	\$.50
One-Half Year,	.30
Single Copies,	.05

While this paper is published with the consent and approval of the President of the University, and the officers of the College of Agriculture and Domestic Science, the editors of this paper are alone responsible for the statements in all unsigned articles.

Address all communications to the Editor-in-Chief, Agricultural Student, Columbus, Ohio.

Entered at the Postoffice, Columbus, O., as second class matter.

BOARD OF EDITORS.

JOHN F. CUNNINGHAM, Editor in Chief
CHARLES W. BURKETT, Business Manager

STAFF.

FRED S. JOHNSTON. C. B. STEWART.
PHILIP BAER, M. IMES.

Lack of interest is often the cause of many serious ailments with the student. When a strong, healthy young man leaves the work or sport of the summer months and buckles down to hard study, he not infrequently confines himself too closely, and the results are not nearly so good as they otherwise would be. This is especially true of the students who come from the farm. I think we will be safe in saying that at least half of our students come from country homes, and such young men are used to quite a good deal of exercise, during the summer months especially. Then when the student leaves home in the fall to resume his studies he should be very careful to preserve the balance between his exercise and his food. It will be plainly seen that unless he takes a large amount of exercise he will have to make the difference in some other way, such as cutting down the amount of food he eats. The quiet student, who follows the pursuits of academic life without exercise, can get along (and be better for it), with a much less amount of food than the active plow boy or the daily laborer. But the student who takes an active interest in athletics will need fully as much, if

not more, than the laborer. For he needs to supply not only his muscles, but his brain, with nourishment.

To the boys from the farm, in fact to all students, we would say: Take a part in athletics; play football, baseball, tennis, or have a cross country run every so often. It will do you good, and the change from work to school, or from recreation to study, will not be so great.

Every county in Ohio is entitled yearly to one scholarship, in Agriculture, Horticulture or Veterinary Medicine. These scholarships are received through the County Agricultural Society, and if the County Agricultural Society is not provided with scholarship blanks, they will be sent to them upon application. These blanks are in the form of a certificate and must be signed by the president and secretary of the society. Every worthy young man or young woman is entitled to one of these scholarships. The holders of scholarships are exempt from all college dues and fees, thus making each scholarship worth about sixty-five dollars. Of course, the student's books and living expenses must be paid for by himself.

The number of scholarships used each year falls far short of the number that should be taken advantage of. Out of the eighty-eight scholarships offered this fall only twenty-six have been taken up. This is a shame; it is just throwing so many college courses away. With the advantages of the agricultural student at the university, it seems strange that these scholarships should not be sought after by many, instead of being rejected and allowed to remain idle. Many of these will doubtless be taken up later in the fall when the boys are free from the fall work, and it is hoped that next year, with our magnificent new buildings and equipment, that every scholarship will be used and not remain idle.

The number of students who have entered the College of Agriculture up to the present date, compared with the cor-

responding date last year, is as follows:

	1895.	1896.
Post Graduate	3	2
Four-year Courses—		
Fourth year	7	4
Third year	3	10
Second year	11	8
First year	16	11
Two-year Courses—		
Second year	9	8
First year	19	38
	—	—
Totals	68	81

Of the members which have entered this fall, six are young women, who have entered the new courses in Domestic Sciences. The increase in the number of new students is marked. The number of students in the first years of the four-year and two-year courses was thirty-five last year as compared with forty-nine this year. The students in the advanced years numbered thirty-three in the fall of '95, while there are thirty-two in these years this fall.

We have often noticed the excellent work which is being done by the Pennsylvania State College to advertise herself through the annual report. These reports are put up in the best shape possible for such publications, printed on good paper with copious illustrations taken from the various departments and the college at large. The President makes a report and then each professor or head of a department makes a separate report of his department, showing the work that is being done, and with numerous illustrations of the students at work, and of the equipment of the department.

At first thought it would perhaps seem that all this was a needless expense, but the effect upon the public is very good.

About College.

Mr. A. C. Harvey, '96, has been elected to the fellowship in English. Mr. Ralph Forgy, who previously held the fellowship, was compelled to resign on account of ill health.

The O. S. U. octette has reorganized and will soon be heard from again. As a musical organization the octette was a complete success last year, and we can hope to see it in the same form this year.

Military drill has come to be about the same as a required study. It is reported that in case a student does not drill the requisite number of hours in any term, he will be failed in that term of drill and will be compelled to make it up as in any other work in college.

A very fine collection of tertiary fossils was received by the geological museum during the summer. They were obtained from the University of Nebraska, partly by purchase and partly in exchange for fossils, and minerals of the Ohio scale.

One of the chief subjects of conversation and contention since the opening of the fall term has, of course, been politics. One may hear the issues of the present campaign being discussed at any time where several students are congregated. The university has a McKinley club and a Democratic Thurman club, both of which are in a flourishing condition. Both have elected officers for the coming year and are busy working for the cause they represent.

The Marine Laboratory, on Lake Erie, established by Professor Kellicott a few years ago, has proven itself to be a grand place for the study of fish and aquatic animals. Professor Kellicott and several students spent some time there during the summer. The time was profitably spent, as the resources for study are rich in that locality.

To the old students the annual Y. M. C. A. and King's Daughters' reception in the fall has come to be a part of the program for the opening of the year. But this year it was omitted. The associations took up this work when it could be accomplished in no other way. But the Woman's Faculty Club has taken hold of social affairs about the university and there is no longer any need of the associations' reception. The association

can congratulate themselves that this work has passed into such good hands.

The Board of Directors of the Athletic Association have fitted the football team out in new uniforms, consisting of scarlet sweaters, moleskin pants and scarlet and gray striped jerseys and stockings. This makes a very nobby layout and makes the best uniform the team has ever had.

Football Notes.

Coach Hickey is training the team in a sharper and shorter practice than is usual here. The teams play about thirty minutes steady, and then, instead of the old-fashioned, long, slow run, every man upon the field goes into a sharp sprint of about fifty yards. This gives the men better practice for sprints such as occur in every game, and at the same time does not overwork the men themselves.

Our line at present is heavier than ever before. Several new men are showing up well, and some of the old standbys are back into their old positions. Crecelius will be back in his old place at guard. He was barely at his prime last year, and was one of the finest. This year he will probably develop into one of the best guards in the state. Delong and Hine have both been playing at center. Delong is an old player and understands his position quite well. Calkins will probably play near the center. Hine is a new man at the game, but is showing up in excellent form. Reed, our old tackle of '94, is back in the line and is playing 'Varsity football.

French is doing excellent work at end. He has captained the team well thus far. He is a splendid general in a game.

Jones, who played center at Denison, will probably play guard, and Huff, an old Delaware tackle, is showing up well at tackle.

Titus is playing a good end. Miller and Westwater have played before and will make good men for the line.

Behind the line Nichols will play half. He is a good man, swift upon his feet, and is thought by many to be one of the best halfbacks in Ohio.

Minshall, an Ann Arbor man, plays a fine end.

Howard has been playing quarter.

Wasson and Huddleson are also showing up well for quarter. Tyler is doing good work at half. Butterworth is also doing good work behind the line. Richt and Butcher are also playing behind the line.

The following schedule has been arranged: Otterbein, Oct. 17, at home; Oberlin, Oct. 29, abroad; Case, Oct. 31, at home; Washington and Jefferson, Nov. 7, abroad; Wittenberg, Nov. 14, at home; Ann Arbor, Nov. 21, abroad; Kenyon, Nov. 26, at home.

Doings of Former Students.

A mere money value cannot be placed upon education without a tendency to cheapen it. Most students are compelled, however, to consider whether the course of study which they are pursuing will better fit them to earn a livelihood as well as give them a fuller understanding of the meaning of life and thus making them better and happier citizens. These thoughts are suggested by a hasty glance at the number of students of the College of Agriculture of the Ohio State University who have gone to work during the past year and who are now occupying positions or fields of usefulness in some measure depending upon their college work.

Among those who graduated last commencement, D. A. Crouner is now dairyman to the Ohio Agricultural Experiment Station at Wooster; P. L. Pfaar has been employed as butter maker for the Mt. Pleasant Co-operative Creamery Company, Mt. Pleasant, Harrison Co., I. T. Reynolds Hill is employed by the Woolson Spice Co., Toledo; J. H. Bone, also of this class, has been appointed assistant in agriculture at Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma. Mr. E. E. Bogue, of the class of '94 and a post graduate student, has been appointed professor of botany and entomology in the same institution; Knott C. Egbert, class of '90, has

been appointed superintendent of the farm of the Idaho Agricultural Experiment Station, Moscow, Idaho; L. M. Bloomfield, class of '91, has resigned his position in the University to accept that of assistant chemist of the Ohio Agricultural Experiment Station.

Of the undergraduates A. G. Abbott has been appointed foreman of the farm of the Purdue Experiment Station, Lafayette, Ind.; Mr. B. M. Rutan, whose recent marriage is mentioned elsewhere, has taken charge of the Jersey herd of Ben. Ames, Mt. Vernon, .; A. L. Whitehead has a similar position with J. W. Sayre, Lexington, Ky.; W. D. Coe is butter maker for the Deerfield Co-operative Creamery Company, Deerfield, Portage Co.; J. W. Wilson, who has been butter maker at Claysville, has recently been elected to fill a similar but more desirable position for the New Concord Co-operative Creamery Co., New Concord, Muskingum Co.; B. H. Brechbill is operating a creamery in Maryland.

Mr. C. E. Spiers, formerly of the class of '96, has rented and is operating the "Hough Fruit Farm," containing 266 acres, at Rootstown, Portage Co. S. D. Ayers, whose marriage is also mentioned elsewhere in this issue, has settled upon the home farm at Hartsgrove, Ashtabula, Co.

The positions and pursuits above mentioned have all been entered upon within the past twelve months, during which time the opportunities for gaining a livelihood have not been generally considered the brightest.

A number of students after two years or more of study have returned to their home farms to become factors in their management. Among those who have thus returned during the past year may be mentioned Frank Ruhlen, Plain City, Union Co.; C. T. Whiting, Kirtland, Lake Co.; A. L. Coddington, Conover, Miami Co.; F. C. Murphy, Condit, Delaware Co.; F. H. Kerr, Monclova, Lucas Co.; L. R. Baldwin, Tiger Mahoning Co.; F. C. Ball, Mt. Vernon, Knox Co.; F. M. Randolph, Somerset, Perry Co., and S. E.

Sweet, Mesopotamia, Trumbull, Co., O. These lists could, of course, be greatly lengthened by referring to a period prior to the last year.

It may be interesting to close this article with an account of the work of the graduates of the courses in Agriculture and Horticulture: William S. Devol, class of '86, is professor of Horticulture and director of the Experiment Station of the University of Arizona, Tuscan; Charles P. Fox, class of '90, is professor of Agriculture and director of Agricultural Experiment Station of the University of Idaho, Moscow; Julius H. R. Fischer, class of '91, afterward finished the course in Veterinary Medicine and then spent a year in Germany, is now professor of Veterinary Medicine in the University of Utah, Logan; Frank W. Rane, of the same class, who has for several years successfully filled the position of Horticulturist to the West Virginia Experiment Station, is now professor of Horticulture and Horticulturist to the Station of the New Hampshire Agricultural and Mechanical College, Durham; William H. Baker, '92, is farming at Farmersville, Livingston Co., Mo.; Hamilton H. Richardson, '92, is gardening at South Brooklyn, Cuyahoga Co.; Franklin P. Stump, '92, formerly assistant in Agriculture here, has purchased a farm near Convoy, Van Wert Co., where he is now farming; James S. Hine, '93, is the assistant in Entomology in the Department of Zoology and Entomology in this institution; W. R. Beattie, '94, has charge of the greenhouses connected with the Botanical Department of the University; Sherman Hood, '94, is gardening at Meander, in Trumbull Co.; C. W. Burkett, '95, is assistant in Agriculture at the Ohio State University, while R. W. Dunlap, of the same class is farming at Kingston in Pickaway Co.; E. J. Riggs, '95, is taking post graduate work in Horticulture and Agriculture at Cornell University.

John W. Beal, Dresden, writes that they handled between 2500 and 3000

bushels of peaches. If they were all like those sent to Professor Hunt, they were certainly very fine. They manage a 400 acre farm and carry considerable stock. They are raising winter lambs, using an imported Dorset ram.

John L. Roberts, Vaughsville, has started a milk route in Columbus Grove.

Franklin H. Kerr, Monclova, O., has invented an automatic milk measuring faucet. This faucet holds one pint of milk. By pushing on a lever the pint of milk runs out. Upon releasing the lever, the faucet again fills with milk. The apparatus is made so that it can easily be taken apart and thoroughly cleansed.

William H. Baker, '92, visited his alma mater during the first week in September. He is operating a thousand acre farm at Farmersville, Missouri.

A Benedict.

We take great pleasure in announcing to our readers the marriage of Mr. Samuel Dana Ayers, a former student of the College of Agriculture, to Miss Flora Alvina Sweet. The wedding took place at Mesopotamia, Ohio, on Thursday, Sept. 10, 1896. Mr. and Mrs. Ayers will be at home after October 15 at Hartsgrove, Ashtabula county, Ohio. As fellow students we wish to congratulate Mr. Ayers, and wish the couple much happiness.

FREE SCHOLARSHIPS.

Important Action by the Board of Trustees.

The Board of Trustees, at its meeting September 22, 1896, passed the following resolution:

"Resolved, That it is the sense of the Board of Trustees that only one free scholarship shall be received from each county in any one year unless there shall be an unexpired scholarship of the preceding year vacant; in which case a scholarship will be received for such vacancy.

"A free scholarship must be presented to the secretary within thirty days from

the beginning of the fall term unless a reasonable excuse is presented for the delay."

This resolution means that if a county allows its scholarship to be vacant for any year, that two persons cannot be appointed next year. One person may be appointed for the two years or the full time, but another appointment cannot be made for one year. If, however, an appointment had been made the previous year, and for any reason the person having used this scholarship one year does not use it the second year, a person may be appointed to fill the vacancy.

The effect of this rule is to make it important that all the appointments to which a county is entitled should be kept full in order that none of its privileges shall be lost.

This recent action does in no way affect the general rule that every county is entitled to make an appointment to the free scholarships in agriculture each year. These appointments are made by the County Boards of Agriculture. They are valid for two years and cover all college dues (incidental and laboratory fees). The appointee is subject to all the other conditions prescribed for admission to the course.

Influence of Legal Enactments on Education.

President James Mills, in his latest report of the Ontario Agricultural College, Guelph, Canada, makes the following interesting observation upon the influence of legal enactments upon education:

"Our college is unique among the institutions which provide education for the people of this province. It is the only educational institution in Ontario, excepting commercial schools and ladies' colleges, which has to rely wholly upon its merits. Students are legislated into our high schools, universities, theological halls, law schools, medical schools, dental college, College of Pharmacy and Veterinary College. If men and women were allowed to teach, preach and prac-

tice law, medicine and dentistry, pharmacy and the veterinary art, without passing a prescribed examination, the attendance of students at high schools, universities and most of our technical schools and colleges would be only a small fraction of what it is at the present time. Very few seek knowledge for its own sake.

If we could secure the enactment of a law which would compel people to pass a prescribed literary and professional examination before engaging in general agriculture, stock raising, dairying, market gardening or fruit growing, it would require a score of agricultural colleges in this province to accommodate the young men who would seek instruction in agriculture and the sciences related thereto. But, under present conditions, persons can engage in agricultoreal pursuits without any kind of preparation; and agricultural colleges, not having behind them the potent leverage of legal enactments, have to depend for their attendance solely upon the character of the education which they give, and upon the desire of young men here and there to obtain knowledge for its own sake, and for the possible advantage which it may be to them in their efforts to make a living."

To Former Students of the College of Agriculture.

I understand from the editor that this issue of the *Agricultural Student* will be sent to all former students of the College of Agriculture of the Ohio State University, whose addresses are known. I therefore asked the editor the privilege of addressing this letter to you in place of a personal letter.

During the last summer I wrote a letter to each student who had been a member of the College of Agriculture during the four years prior to last year. I asked each of these students to send their address and occupation in order that I might have an accurate directory of such students. I have had a number of answers to my letter, but there is still a large

number of young men who have not yet answered it. I feel sure that this letter has been merely neglected and forgotten in the midst of more pressing duties. I wish to ask all former students including those who were here last year and who have not returned, to kindly send me their present address and occupation. I feel quite sure that former students will be anxious to help me secure a correct directory, which will not only be very interesting but important in many ways. This directory is especially important to those who may be willing to accept positions which may be offered them. I frequently have inquiries for young men to fill positions which I am unable to answer satisfactorily because of the lack of knowledge concerning the present occupation of former students.

I wish to call attention again to the special winter course in dairying which begins on the 6th of January and continues for eleven weeks. Former students can do much in calling the attention of young men and women, and older ones, to this special course. It cannot in the nature of the case take the place of the more extended courses of the College of Agriculture. This course, however, will enable many persons to increase their earning capacity by managing creameries or cheese factories, or by improving their dairy methods on their farms. A number of young men have already secured employment in creameries and on dairy farms at reasonable compensation as a result of this special course, and I have had more inquiries for young men to fill such positions than there have been young men to fill them.

In closing, I wish to call attention of former students of this journal. The students who are editing it not only assume all responsibility for its editorial management, but also for its financial success. They have no other means of paying the cost of this publication except through its advertising and subscription lists or their own pocket-books. It seems to me that it is a paper creditable alike to the editors, to the students of the Col-

lege of Agriculture and to the college itself. It deserves your hearty support. Will you not give the paper your support by promptly subscribing for it and by inducing others in your neighborhood to subscribe? If you know a man in your neighborhood who might be interested in the work of the College of Agriculture a copy of this journal sent to him for the year would do much to influence him to enter upon such study. It is nearly as easy to send a subscription for two copies as for one.

THOMAS F. HUNT.

Townshend Hall.

The foundations are now being laid for Townshend hall, the agricultural building which is located at the west end of the campus.

slow burning construction throughout, with painted interior brick walls, exposed beams, maple floors, and hard pine finish.

Throughout the dairy department, which has about six thousand square feet of floor space, the floors will be of tile and the walls will be wainscoted with enameled brick.

On the left of the entrance, which is twenty-eight feet wide, is the office of the Department of Agriculture, with a private office, a stenographer's room and fire-proof vault. Connected with the office on the south is an assistant's room, opening into a laboratory for advanced students. At the extreme south end of this floor is a large laboratory for student work in soils and farm crops. Connected with this laboratory is a balance



This building will be two hundred and sixty feet long, and varies in width from sixty-four to seventy-eight feet. It is to consist of two stories and a basement which is fourteen feet high. The walls above the basement line will be of gray pressed brick. The basement walls will be of cut stone, and the trimmings will be of terra cotta of the same color as the brick. The roof will be covered with cherry red tile. The building will be of

room, a store room, and an instructor's laboratory. On the west side of the main corridor and connected with the instructor's room, is a large class room opening into a preparation room with a dark room. This class room is fitted with all appliances for showing lantern slides of live stock, buildings, machinery, etc. On the same side of the corridor and on the right of the stairway leading to the basement and second floor are the

class room and instructor's room for dairying. On the right of the main entrance is the department reading room. The north end of this floor is occupied by the museum (which is fifty-four feet by sixty-seven feet) with an attendant's room. The north end of the high basement is occupied by the Dairy Department. This consists of a receiving room, a pasteurizing room, a store room, a refrigerator room, a lavatory, butter-making room, two cheese-curing rooms, and an instructor's room.

In the south end of this floor is a live-stock room about forty feet square. One-third of this room is occupied by raised seats, the remaining floor space being used for exhibiting and judging live stock. Connected with this is a room fitted with stalls for the temporary accommodation of live stock when needed for class exercises. The basement also contains soil-storage room, bath room, toilet rooms, repair shop, locker rooms, bicycle room and janitor's room. A small detached building will furnish steam and power for the Dairy Department. Detached from the main building, but connected with the soil-storage room by a tramway, is a glass house thirty feet by forty feet, for the study of soils and the experimental growth of plants.

The north end of the second story contains a large student laboratory (sixty by seventy-five feet) for the Department of Agriculture Chemistry; connected with an organic and analysis laboratory, a balance room, a store room, and a private laboratory. The lecture room of this department is at the south end of this floor and will seat one hundred and sixty students on raised seats; with a preparation room adjoining. There is also on this floor a class room connecting with preparation room, store room and instructor's room; which will be used temporarily by the Department of Veterinary Medicine. There is also an extra class room, ladies' toilet and locker rooms, and a hall for the use of the Townshend

Society, designed to seat about two hundred persons.

The purpose of this building is to bring together the work of the Department of Agriculture which is now done in cramped quarters in three different buildings, and to give more space for the Department of Agricultural Chemistry, which has outgrown its present suite of rooms. The bringing together of the work of these departments into this new building will give much needed room in the buildings vacated. It may be well to correct the impression that has been gained by some that the Department of Domestic Science is to be housed in this building. The rooms in the east end of Hayes Hall were built especially for this department and they will be fitted up for this purpose as soon as the professor of Domestic Science is appointed and takes charge of the work of the department.

Townshend Hall will undoubtedly be the most complete structure ever erected in this country for the purpose of instruction in agriculture, and will bear the name of the late Dr. N. S. Townshend as a memorial to his public services and his work in advancing the cause of agricultural education.

The contract for the erection of this building has been awarded to the Columbus Construction Company at about seventy thousand dollars. The architects are Peters, Burns & Pretzinger, of Dayton, O. Good judges say that the plans and specifications are of an exceptionally high order. The superintendent of the building, representing the architects, is Mr. L. H. Goddard, class of '92, which is a guarantee that the building will be erected in accordance with the plans and specifications.

—[*The Lantern.*]

The Influence of the Ohio State University Upon Ohio Agriculture.

The sixth annual report of Farmers' Institutes held in 1895 and 1896 under the auspices of the Ohio State Board of Agriculture, and the proceedings of the Central Farmers' Institute, and the

51st Annual State Agricultural Convention has been recently published. It contains two addresses by President Canfield, one on "Any Fool Can Farm," delivered before the State Agricultural Convention, and the other delivered before the Central Farmers' Institute on "The Use and Abuse of the Forests." The report also contains the president's address of the Ohio Dairymen's Association by Professor Thomas F. Hunt, and also a paper entitled "A Problem in Intensive Agriculture." Each of the following professors of the university contributes an address or paper: Professor H. A. Weber, on "Food Adulteration in Its Relation to Health and Fraud;" Professor N. W. Lord, on "Commercial Fertilizers;" Professor W. D. Gibbs, on "Soil Moisture as a Factor in Plant Production;" Professor H. J. Noyes, on "The Management of the Cheese Factory;" Professor Bleile's discussion of the paper of Professor Plumb, of Purdue University, on the question, "Shall We Pasteurize Our Milk or Cream," we quote in full below:

That pasteurization of milk is a measure, the general adoption of which would be followed by beneficial results, is certainly true. Especially is this so where we have to do with a promiscuous supply such as is usually furnished to cities. The germs of the diseases mentioned have, by most positive proof, frequently been carried by milk and infection in this way produced. In addition to these special germs, a mixed lot of bacteria may be found in milk, bacteria that can produce intestinal disturbances not of a specific nature. If milk were generally pasteurized cholera infantum would become a rare disease.

"It seems to me, however, that the danger of infection by tubercle or consumption germs is overestimated. In a cow affected with consumption of the lungs—the commonest form—the chances for having bacteria in the milk are very slight and, unless the udder or teats are diseased, it is not common to find these germs in milk. Then, too, milk is not

a good medium for the growth of tubercle bacilli as it is for the typhoid and other bacteria. The tubercle bacilli can keep alive in milk and especially their spores, but multiplication and growth do not go on in any noticeable extent. As to the experiments on animals fed with milk from tuberculous cows, several objections might be raised. In the first place it does not appear absolutely proven that the cows used had lung consumption only, and that some of them may not have had tuberculosis of the udder. Then the percentage of animals that got consumption is comparatively small. In laboratories where such experiments are usually carried on, animals sometimes contract consumption of unknown origin, laboratory infection so called; this is a fact to be borne in mind in the interpretation of these results. More experiments on this point are needed, as different observers have obtained different results.

"If milk were such a common source of infection with consumption we ought to find tuberculosis of the bowels as the most frequent form of consumption, whereas it is well known that the lungs are first affected in a great majority of the cases. The usual way of infection in such patients is by the expectoration of consumptives. They cough and spit promiscuously, the spittle dries out, is ground into dust and then breathed in by others. Efforts made to care for such matter would materially lessen the number of cases of consumption.

"The danger of infection by dairy products as butter and cheese must be very little, much less so even than by milk, as these substances themselves and their mode of keeping are quite unfavorable to the life of the germs."

The Relation of Science to Agriculture.

In briefly discussing the relation of science to agriculture it will be well at the outset to try to understand what we mean by "Science."

In this age almost every branch of knowledge, every pursuit, vocation or profession is dubbed a science, or we are told that it is both a science and an art. It is plain that not every branch of knowledge is a science, but where shall the line be drawn? Instead of trying to define science in a few words, let us notice some of the more important characteristics. In the first place science deals with objective truth which is the same for all. In other words, it has to do with statements of fact which may be verified. Any branch of knowledge, with a considerable array of facts, upon which all men by the compelling power of inherent truth may be brought to an agreement, is a science. It classifies and systematizes facts so that they express the laws of nature, or in the language of Kepler—the thoughts of God. Isolated facts, however great the number, are not science any more than isolated words are sentences.

Various branches of knowledge are continually rising to the dignity of science. This is especially true of all knowledge that appeals to the physical senses, to the reasoning powers or to the intellect of man.

We are perhaps justified in calling agriculture both an art and a science.

We know that it is the first and most essential of human arts, and we believe that it is fast attaining the dignity of one of the most important of human sciences. It is and probably ever will be more of an art than a science.

We must not confuse science with art. Art is practice, execution. It has to do with the ways and means of accomplishing certain ends. Science has to do with the explanation of these ways and means. It deals with causes and effects. In its strict significance it has nothing to do with practical applications and is not directly concerned with economic results.

Probably there is no art or profession known to man that draws its knowledge from so great a variety of sources as does agriculture. Nearly every known science is contributing some facts that are either directly helpful or which are at least sug-

gesting new lines of inquiry, observation and experiment.

In our age the sciences of chemistry, physics, botany, geology and entomology are among the most intimately related, and are probably the most helpful to agriculture. It can scarcely be disputed that these sciences are the natural bases of a sound practical knowledge of the every-day things of life, a knowledge which the farmer of all men can least afford to miss.

Of the sciences named above chemistry plays the most important part, being intimately connected with, and concerned in, those transformations or changes in material substances which the agriculturist is constantly endeavoring to effect.

Without chemistry it is impossible to understand the character and constitution of the soil, the elements of which it is composed, and the laws which govern their relations to each other. Who can measure the influence that the first great lesson taught by chemistry has had upon the agriculture of the world? The lesson is that matter can neither be created nor destroyed.

Chemistry proved beyond question that every minutest particle of the plants which go to make up the crops of our fields and gardens, the roots and branches, stem and leaves, buds, blossoms and fruit, all come from pre-existing matter found in other forms in earth and air. The growth of a corn-stalk or an apple tree is simply transformation, not creation. Burn the stalk or the tree and the proofs of chemistry are equally conclusive that all the component parts are in the gas, smoke and ashes ready to be transformed or assimilated into another stalk or another tree. We know, therefore, that no finite power can either create or annihilate a single particle of matter. Coming to one of the latest and no less interesting or important lessons of chemistry, and we find in it the complete overthrow of a supposed definite distinction between organic and inorganic matter. The artificial production in the laboratory of any organic compound

whatever appears to be a mere question of time and skill. It is quite safe to predict that chemistry will ultimately succeed in generating every organic substance known. It may be doubted, however, if chemistry can ever go much farther in this direction. Science may be able to form sugar, pectose, malic acid and all the ingredients of our apple; it may produce in like manner the starch, cellulose, vegetable fibrin, etc., found in the potato, but when all this has been done, it will be as impossible as ever to artificially produce a single specimen of the Rhode Island Greening or Early Ohio.

It is well known that every plant, large or small, herbaceous or woody, annual, biennial or perennial, is composed of certain elements or compounds, whereof by far the larger portion comes from the atmosphere, a much smaller, though constant and no less essential part, coming from the soil. The elements which are absorbed or imbibed directly from the atmosphere are usually found in abundance, and are yielded freely to all growing plants. Hence, the really important question is this: Are the necessary elements that are furnished by the soil present in such quantities and under such conditions that the needs of the plant are fully supplied? As a general answer to this question I believe that it can be safely asserted that there is not a single acre of land anywhere within the borders of the United States so rich in all the elements of available plant food that the production therefrom could not be increased by some application of fertilizer. The intelligent practical agriculturist or horticulturist cannot fail to ask himself the following questions:

1st—Wherein is my soil deficient?

2d—How can I best restore and maintain fertility?

Can science answer these fundamental questions? Perhaps not definitely or confidently. But who, unaided by science, can answer them all? Can practice? No! Practice is silent after sixty centuries of experience. Who can de-

cide whether the soil does or does not contain the elements requisite for a healthy growth and perfect development of wheat or potatoes, or strawberries or apples?

Who knows, except as he blindly infers from results what mineral ingredients of this crop or that crop are deficient or in excess? How shall one ever know unless enlightened and assured by the aid of science? Let me not be misunderstood. Science cannot answer all questions. It often fails. But only give science time enough and it will tell us the truth and the whole truth in the end.

The analysis of soils whereof much was heard and more was hoped a few years ago has fallen into utter discredit, and the analysis of feeding stuffs and fertilizers appears to be of doubtful value as far as its determination of practical results is concerned. Let us concede that every analysis yet made was and is worthless, yet this should not shake our faith that the time is coming when under the guidance of a more highly developed science, a science that is more profound, soils and the products therefrom will be analyzed so that the results shall be directly and signally profitable. As we have seen the science of chemistry has not failed to teach us that every pound of grain or hay, orchard fruit or garden vegetable, abstracts from the soil in which it grows certain mineral elements and that this soil is the poorer by just the amount so taken. The amount abstracted may be small and the residue large, but as no bank deposit was ever so great that continual drafts would not ultimately exhaust it, so no soil was ever so rich that continual cropping with giving nothing back would not ultimately render it sterile and worthless. Science teaches us how to prevent such exhaustion, in part by the use of clover and a judicious rotation of crops, and in part by a constant replacement of the elements annually borne away.

If time permitted, I might show what physics, botany, geology, entomology, meteorology and other sciences have done

for the farmer's art. It is not my purpose, however, to dwell on details more or less familiar to all, but to point out in a general way the relationship between sciences and agriculture. We should not forget that all the science in the world has never of itself made one good farmer. The art of agriculture is learned by practice, by imitation, by experience. Men are raising good crops today who know nothing of science, and do not consider an acquaintance with it any way conducive of success. It is also true that many a man with a fair knowledge of science has signally failed when he attempted to put this knowledge into practice on the farm. Have we not a right to question the value of our much boasted, almost glorified "Agricultural Science" if the untaught Hungarian peasant, the recently freed Russian serf, the semi-civilized Chinaman, can raise, with no advantage of soil or climate, a larger product from a given area than the comparatively educated farmers of the United States? Judged by the standard of crop production alone we might almost say that agricultural science is a failure, but is this the real test of the true value of science? By no means. Great as has been the accomplishments of science in the material world; glorious as are her victories over the forces of nature; it is in the intellectual and moral world where she has seen the greatest triumph. This is particularly true in the relation of science to agriculture.

Science has made farming an intellectual pursuit. It has elevated it from a calling which only required and rewarded inferior capacities, to one that demands the amplest knowledge of nature's laws and the noblest efforts of the human mind. If science has not always made better farmers she has never failed to make broader and better men. It is not knowledge only, but an intellectual awakening that has been and is most needed by the tiller of the soil. This science gives. Science has taught the farmer that this is a world of loss; that each event in nature is the logical se-

quence of the events which preceded it. He no longer has faith in signs, omens and portents. Science has developed his reasoning power, and this leads him not only to observe and experiment, but to divine causes, to apprehend relations, to construct theories and to draw conclusions.

Men may, often do, think and reason upon various social, political and religious questions, but the conclusions cannot be verified. How different is science. Nature herself answers nature's problems. The facts, ideas and theories of science may be compared to the different forms of organic life. There is the same "struggle for existence" and the same "survival of the fittest"—nothing but truth can exist. Whence comes this signal and far-reaching advance in morality so well seen in rural life? Drunkenness, gambling, licentiousness, are far less common than they used to be. One cause of this, I am sure, is the fact that science has laid bare the dire results which inevitably flow from such vices. It enforces as nothing else can do the truth of the biblical saying, "Whatsoever a man soweth that shall he also reap."

Science has made country life sweeter, cleaner and more self-respecting.

Gentlemen of the Society for the Promotion of Agricultural Science, I take it for granted that you all believe in the intimate relation that science bears to agriculture; that you are satisfied of the importance of scientific research to the practical operations of the farm and garden. If satisfied of this, you must also be satisfied of the importance of spreading a knowledge of the results of such research especially among practical farmers.

As its name implies, the object of this society is the promotion of Agricultural Science. To what end shall Agricultural Science be promoted? Are there not at least two objects we should keep constantly in view? The first is the improvement of the agriculture of the country, and the second is the elevation intellectually, morally and socially of the whole

agricultural community. It will take time to accomplish these objects, but if these results are not realized in the end we may reasonably conclude that we have been deceived and that science is really of no use to agriculture. I believe that the agriculture of this country is very far below the standard which it should ere this have reached. In an age when every child may be fairly educated if he will, there ought to be more fruit gathered from the tree of knowledge and science.

Is it not possible to make this society truly representative of the agricultural science of our age? Shall we not have an organization which will incite thousands of the aspiring, ambitious youth of our country to take a livelier interest in the great art of agriculture and impel them to gain a more perfect mastery of the sciences which minister to its improvement and efficiency? I trust that those of us that love agriculture and the sciences pertaining thereto will try to realize that this society ought to be one of the strongest, grandest organizations in the country. Let us intelligently resolve to do our part toward making it what it might and should be.

Professor W. R. Lazenby Before the
Society for the Promotion of Agricultural Science.

Living Matter.

When this phrase comes to our notice we at once form in our mind a certain estimate of it by which we give to it a more or less clearly defined meaning. Our conception may be inadequate to set the complete boundary lines of meaning, but yet most anybody can tell what living matter is—it is “living,” not dead matter. Now matter is anything which occupies space or is perceptible to the senses. It follows that everything in the universe is matter, but all matter is not living matter. Of all known matter there are sixty-nine kinds; each is called an “element.” Living matter is that substance which contains the force by which the organs of the individual are started

and continued in performance of their functions. More briefly, living matter is that which contains vital force.

But some one says the definition might be more simple; living matter is that which takes nourishment, grows, moves, or reproduces itself. No “one” of these processes going on in matter will cause it to be “living” matter, but living matter must have all four of these properties; but all do not need to continue throughout life.

Living matter is divided into two classes—animals and plants. These both take nourishment, take in and absorb food; they both grow, increase in size; they both move, not all by locomotion, but they all have movements of protoplasm in the cells; they both reproduce their kind if their life is left to its full course.

All present life, plant or animal, has sprung from preceding life, and so the line of descent or parentage can be traced back to a time that we can conceive as the beginning of life. The old life, rather the first life, was of a very simple form—a single celled animal or plant. In very low forms of life it is very hard to distinguish between plants and animals. The characteristic most nearly separating plants from animals is perhaps the kind of food consumed. Animals require organized matter, as plants or other animals, for their food; while plants take their nourishment from “mixtures” of certain elements—matter that is not organized or that which did not grow. The descendants of the first life (single celled life) became more complicated and complex (many celled), accordingly as the surrounding conditions changed. The witnesses to this statement are the imbedded forms of life in the stratified rocks contain only the forms of the very lowest life. More recent stratified rocks contain the more complex forms of life, and so on until the newest rocks in which are found preserved parts of life similar to the present living forms. Of course some connecting links in the line of descent are missing, but enough has been

found to establish the proposition that all present life has developed by a long and gradual change. P. B.

Dehorning.

Dehorning, or the practice of removing horns from cattle, is of comparatively recent origin. It was first advocated in this country in 1885 or '86, and since that time it has come to be extensively practiced by cattle owners throughout the country.

Despite the fact that many object to it as being cruel and unnecessary, it has been found to be of great practical utility, rendering the animals more quiet and docile, as well as preventing them from injuring each other or mankind. Another advantage is that they may be stabled or shipped more economically, and it is claimed by some able writers that polled cattle fatten more rapidly than the horned cattle.

The operation—though quite painful for a short time—is a simple as well as a safe one, and when properly performed and the wounds taken care of, is not followed by profuse hemorrhage or dangerous reaction of any kind. The reports from the experiment stations where dehorning has been carefully experimented upon show that there is a slight rise in temperature after the operation, but no appreciative difference in milk flow. Ordinarily a slight injury to a cow results in a marked reduction of the milk flow, and the milk record is a good criterion of the physical condition of the cow. Therefore, we are safe in assuming that no functional derangement results from the effects of dehorning; or is the cow seriously inconvenienced in any way.

Authorities seem to agree that the best time for dehorning is during the mild winter weather. As there is at that time no danger from flies and the animals can be better cared for. But our method here at the O. S. U. Farm during the last year has been to sell a cow as soon as she approaches the end of her period of lactation and replace her by a fresh one.

Thus we have cows coming into the

herd at all seasons of the year. The majority of these cows have not been dehorned, and as it would be unsafe to turn them in with the herd (of which all are dehorned), we dehorn them at once, whether the weather is warm or cold, and the operations performed during the warm weather have proven perfectly satisfactory. But where we dehorn but one or two head at a time, our practice has been to bandage the wounds and in hot weather to cover the bandage over and around the wound with a coat of pine tar. This protects the wound from the flies and dirt. During fly time the wounds are also disinfected with a two per cent. solution of carbolic acid as often as once every day.

The most approved method of removing horns is by the use of dehorning clippers. Any of the late improved clippers are far superior to the saw. The most satisfactory instrument of the kind yet used here on the O. S. U. farm is the Keystone clippers.

During the operation of dehorning the animal should be securely fastened, preferably in a strong stanchion. In adjusting the clippers set them low enough to take away about one-eighth of an inch of skin with the horn. Here is where many new beginners make a mistake, in not clipping close enough, thus leaving unsightly stumps protruding from the head. Care should be taken not to wrench the handles of the clippers. They should be brought together if possible at one steady pull. The movements of the operators should be rapid, but care should be taken not to excite the animal unnecessarily. Excitable animals seem to bleed more profusely than quiet ones.

After the operation remove the animals to the stable where they may be quiet. If profuse bleeding takes place the wounds may be bandaged; or a handful of flour applied to each.

But by far the most effectual and humane way of ridding cattle of horns is by preventing their growth. Various chemicals have been used for this purpose, but from the many experiments

tried caustic potash has proven to be the most satisfactory. It is easily applied and the operation may be performed by anyone. When the calf is from ten to twenty days old clip the hair from over the embryo horn and moisten that part of the skin which has been clipped with a little ammonia or soapy water to remove the oily substance secreted by the skin. Then moisten the end of a stick with caustic potash and apply it to the spot over the horn; continue to rub until the skin becomes quite sensitive. The whole operation requires but a few minutes. A scab will soon form over the surface, which will fall off in the course of five or six weeks, leaving a smooth, hornless head.

Protection for the Dairy Cow.

It takes a long time for farmers to realize that for successful dairying or even the keeping of but a few cows for milk and butter, they must be protected from the rain and snow and cold weather in the winter time.

A stove will not radiate much heat if water is continually poured upon it, and just so, if sleet and cold and wind are poured upon the dairy cow, you can set it down as a fact that she will not give much milk. In fact, when cows are warmly protected in barns, sudden storms and cold waves will cause, as a rule, a diminished yield of milk in about seven cases out of ten, and to carry it a little further, how much more should he expect as loss when cows are poorly, if at all protected? If farmers could just realize that when they leave their cows out in all kinds of weather (and who of us have not seen them thus?) that they not only give a far less yield, but that their health is impaired and that nearly twice the amount of food is needed for the animal; if they could realize this and see it, and profit by it, they would be amply repaid for any expense needed in preparing a barn or stable in which to stable the cows during the winter months.

If cows are well taken care of, every-

thing seems to indicate that they will give just as much milk and of just as good quality in bad weather as in fair.

CONTEST

In Judging Cattle—Open to Students.

W. B. Smith & Son, breeders of pure Holsteins, offer the following prizes for judging cattle:

First prize	\$10
Second prize	7
Third prize	5
Fourth prize	3

This contest is open to students in Agriculture I. and Agriculture VII. Many breeders within a radius of fifty miles of Columbus have been invited to be present on this occasion. This firm offered the same prizes last year to Agricultural students from the O. S. U. and the results of the contest were very satisfactory. W. B. Smith & Son seem to be deeply interested in the work in Agriculture done at the University, and we should congratulate ourselves upon having such good friends near us.

This opportunity is one that should not be missed by students in Agriculture. Professor Hunt will gladly give the particulars and conditions of the contest to anyone interested.

Comfort of Farm Animals.

The farmer, and especially the stock raiser, should ever bear in mind that upon the comfort and enjoyment of his animals his success as a farmer largely depends. And the dairyman should always remember that if his cows have cause to be uneasy for any reason whatever his returns will not be so good.

The feed that animals receive for their daily rations has much to do with their ease and comfort. A herd of dairy cows fed upon a palatable ration will be a success, while the same herd fed upon the same ration chemically but in a different form, may prove a failure as a dairy herd. The reason is that

one ration is relished by the cows and the other is not. They will eat the second ration, to be sure, in the absence of anything better, but will not do so well upon it. A common case which will serve (in part) to illustrate this, is the relative feeding value (for milk) of ensilage and dry cornfodder. The dry matter of ensilage which is taken from the pit in the midst of winter is not much, if any, different from the dry matter of the cornfodder which remains shocked up in the fields. But all dairymen, and all of the experimenters, declare that ensilage is the best feed for milk. To be sure, the ensilage contains more water than the fodder and thus the cows will not have to drink so much water when on ensilage food. But the chemical composition of this food is about the same as with cornfodder and they do much better on ensilage. But the dairymen tell us that they like the ensilage better than the cornfodder, and this in part may explain it. For, the cows having a food which they relish, enjoy it and are quiet and restful, and this is exactly the condition they should be in for the best profit to the dairyman; while if their food is not exactly suited to their taste they become restless and thus disturb the functions which the dairyman aims to aid. Again, the feed may be of the best and be relished by the animals, but the shelter may be of such a nature that the animals will be exceedingly uncomfortable, and this applies to all alike—horses, cattle, sheep, swine and poultry. In some places all the shelter which is accorded the family cow is the leeward side of a barbed-wire fence, and she still furnishes her pittance toward lessening the strain upon the family cable. But, sorry to say, all your dairy stock is not as hardy as this, and must have a more sheltered abode. Warm barns and sheltered yards will pay for themselves. If you don't believe it, try it for yourself and you will see.

Subscribe for **THE STUDENT**.

Soil Moisture as a Factor in Plant Production.

BY PROF. W. D. GIBBS.

Before Central Farmers' Institute, January 1, 1896, Columbus, O.

Of all the factors influencing the growth of plants, water is, without doubt, one of the most important. Scientists have for a long time recognized this fact but not until recently have practical farmers come to understand its importance. An evidence of the increasing knowledge along this line is shown by the widespread interest that is being taken in irrigation, not only over the arid regions of the West, but also in the humid climate of our own and neighboring states.

More attention has also been given to improved methods of plowing and cultivation with a view to retaining the greatest possible amount of moisture in the soil where it may be taken up and utilized by growing crops.

An idea may be formed of the importance of moisture in plant growth if we look at the amount contained in some of our farm crops. The fact that green plants lose a large proportion of their weight in drying is familiar to all. Pitching a given amount of green grass on a wagon is vastly different from pitching the same bulk of dry hay on the same wagon. The loss plants sustain in drying is made up largely of water, the amount of which, compared with the dry substance found in plants, is very great. In one hundred pounds of green corn fodder we find seventy-five to eighty pounds of water; in one hundred pounds of fresh meadow grass sixty to seventy pounds of water; in one hundred pounds of red clover eighty-six pounds of water; while in melons, cucumbers and turnips there is often as much as ninety per cent. of water in every one hundred pounds of fresh material. Seeds do not contain nearly such large amounts of water. Wheat, rye, and oats contain about fourteen per cent. each, while corn contains twelve per cent. Even in dry fodders

we find considerable moisture, averaging forty per cent. in dry corn fodder, thirteen per cent. in well cured timothy hay, and as high as nine per cent. in dry wheat and oat straw. It is impossible at ordinary temperature to dry out all the water held by plants. This can be removed only by prolonged exposure to high temperatures.

All of our agricultural plants obtain their water exclusively through the roots. Leaves and stems do not absorb water to any appreciable extent. A well developed root system is of the highest importance to plants. Roots are the plant's water pumps.

In this connection it may be mentioned that in soil moisture as in everything else there may be too much of a good thing. The plant depends largely for its ability to do work on four factors, heat, light, food, and water. If these are furnished in the right amounts at the right time the maximum amount of work is performed by the plant and the growth occurs; if, however, any one or all of these factors are deficient, or in excess, the ability of the plant to do what is required of it is impaired. Excess of water in the soil fills the air spaces and causes the plant to suffer from the want of oxygen.

It has been found that if the water in soil amounts to seventy or eighty per cent. or more of its water holding capacity the soil is not well adapted to plant growth. Most plants do best when the water in the soil amounts from forty to sixty per cent. of the water holding capacity. Soil well adapted to wheat has been found to contain about thirty pounds of water in every one hundred pounds of the fully saturated soil. The amount of water in this soil most favorable to the growth of wheat is from forty to sixty per cent. of thirty, or about twelve to nineteen pounds of water per hundred pounds of soil.

Plants take water from the soil by means of minute root hairs which branch out from the main roots and thread their way through the soil, pushing around

and between soil grains in all directions. Water taken up by the roots passes upward into the stem and foliage of the plant. It will be remembered that all of the mineral of plants, and nitrogen, are taken from the soil, and these can be taken only through the medium of water. The water absorbed by roots, then, is not pure, but contains in solution small quantities of all the soluble compounds in the soil. Some of these compounds are absolutely essential to the maturation of the plant. A soil may contain an abundance of plant food, but if there is not sufficient moisture present to dissolve this food and carry it into the plant tissues, the soil is a barren waste. This is precisely the condition of affairs over much of the drouth stricken area of our Western states. Plant food is abundant, but there is not sufficient moisture present to dissolve it and carry it to the plant.

The amount of water used by crops during the growing season is very large. Prof. King, who has made extensive experiments along this line, finds, that in Wisconsin the following amounts in tons of water per ton of dry matter and in inches of water per ton have been lost by evaporation from plants and soil:

Dent corn used 309 tons = 2.64 inches water per ton of dry matter.

Red clover used 452 tons = 4.03 inches water per ton of dry matter.

Oats used 522.4 tons = 4.76 inches water per ton of dry matter.

The fact that growing crops take large amounts of water from the soil was clearly shown in an experiment with rye on the Ohio State University farm. The field used was of uniform fertility. A crop of rye was grown on a portion of this field while the other portion remained fallow. Several days before the rye was harvested the portion of the field which grew no rye was plowed and prepared for corn. After the rye was removed that portion of the field was plowed and prepared for corn, then the whole field, including the portion which had grown a crop of rye and the portion which had not, was planted to corn. When we

came to harvest the crop of corn we found a great difference in the appearance of the plants on the rye ground and on the fallow ground. The stalks of corn on the rye ground were smaller and at least one-third shorter than the others. The yield of ear corn for ten shocks, each ten hills square, on the rye ground was six hundred and ninety pounds, while for ten shocks of the same size on the other portion of the field the yield was two thousand and one hundred and twenty-five pounds, or more than three times as great. The yield of straw on the rye ground was one thousand pounds, while on the other ground the yield was two thousand four hundred and thirty-five pounds, or more than four times as great. To what shall we attribute this great difference in yield? Can it be possible that the rye crop so completely exhausted the soil of its fertility that it could not grow a fair corn crop? I think we agree that this could not be the reason. Let us see how much water was taken from the soil by the rye crop. There were harvested from fifteen acres, thirty-three tons of green rye, or thirteen thousand two hundred pounds of dry matter. As it requires four hundred pounds of water to produce one pound of dry matter or rye we see that three hundred and fifty-two thousand pounds of water or one thousand and two hundred barrels were pumped from each acre of ground by the rye roots. While we cannot say certainly that the lessened yield on the rye ground was due to scarcity of water we know that all the facts at hand support this theory.

Now if we are agreed that water is a factor of so much importance to plants we understand at once the necessity of carefully guarding the supply of moisture in our soils to prevent waste either by excessive evaporation or from flowing off over the surface, or loss by percolation through the soil beyond the reach of plant roots.

There can be no doubt that conservation of soil moisture is one of the most important questions before farmers today. The excessively dry seasons of the

past few years emphasize this fact. It is well to think and talk about the practicability of irrigating our farms, but in the meantime let us see to it that we adopt only the best methods of cultivation, and that soil moisture is saved by every possible means. The farmers of our state have to compete in open market with the vast fertile prairies of the West. This is an additional reason why Ohio farmers, in particular, should give the closest attention to practical methods by which crop production may be increased.

Location for Poultry Building and Yards.

Too often the location of the poultry house is thought to be of minor importance, and consequently is given less consideration than that of any other farm building.

Frequently the other buildings are located first and the poultry house then placed on the most convenient space, when it should have received consideration before the larger buildings were all located.

In caring for the various classes of livestock, the question of labor is always an important item, and the class that requires the closest attention to petty details as a rule requires the greatest amount of labor. As poultry keeping is wholly a business of details, the economy of labor in performing the necessary work is of great importance. Buildings not conveniently located and arranged become expensive on account of unnecessary labor.

As it is necessary to visit poultry houses several times each day in the year, convenience is of more importance than in cases of almost any other farm building. The operations must be performed frequently, so that any little inconvenience in the arrangements of the buildings will cause not only extra expense in the care, but in many cases a greater or less neglect of operations that ought to be performed carefully each day.

Poultry houses are likely to be more or less infested with rats and mice, unless some means are provided to exclude them, and this should be taken into account in selecting a location. It is generally best to locate the poultry houses at some distance from other farm buildings, especially if grain is kept in the latter. Convenience of access and freedom from vermin are two desirable points to be secured, and they depend largely upon the location. Everything considered, it is safest to have the house quite isolated.

A dry, porous soil is always to be preferred as a site for buildings and yards. Cleanliness and freedom from moisture must be secured if the greatest success is to be attained. Without doubt, filth and moisture are the causes, either directly or indirectly, of the majority of poultry diseases, and form the stumbling block which brings discouragement and failure to many amateurs. It must not be inferred that poultry cannot be successfully reared and profitably kept on heavy soils, for abundant proof to the contrary is readily furnished by successful poultrymen who have to contend with this kind of land.

The necessity for cleanliness, however, is not disputed by those who have had extended experience in caring for fowls, particularly the less hardy breeds.

That an open, porous soil can be kept comparatively clean with much less labor than a clay soil will be evident to those who are at all acquainted with the habits of domesticated fowls. When the fowls are confined in buildings and yards, that part of the yard nearest the buildings will become more or less filthy from the droppings and continual tramping to which it is subjected. A heavy or clayey soil not only retains all of the manure on the surface, but by retarding percolation at times of frequent showers aids materially in giving to the whole surface a complete coating of filth. If a knoll or ridge can be selected where natural drainage is perfect, the ideal condition will be nearly approached.—Bulletin No. 41, U. S. Department of Agriculture.

The Effect of Cutting Up of Foods.

In what form to feed the coarse foods is the question to many farmers. It is held by some that the best way to get the best results is by cutting up the food. But the consensus of opinion is against this idea. Not much has been done in the way of experimentation on this point; possibly the Maine Experiment Station has made the most complete trial of this and found no advantage in cutting up food for dairy cows. The plan was to determine the value of unchopped food as compared with chopped food. Hay was used in this case. The chopped was cut quite fine and moistened, and the grain thoroughly mixed with the chopped material. This mixture was allowed to stand several hours before feeding. Previous to beginning the feeding of the ration in this manner, the animals were receiving hay and a mixture of two parts of cotton seed meal, two parts of corn meal and one part bran by weight. During the time that the chopped and moistened ration was fed the kind and quality of food given remained unchanged and at the end of the period of 51 days the animals were returned to the former ration, that is, unchopped hay, and grain fed dry. A careful record was kept of their yield and of the quality of the milk, this being done, it became possible to ascertain whether chopping the hay and thoroughly mixing the grain with it after moistening, had any appreciable effect upon the production. The Maine station found that there was no evidence that chopping the hay had any effect upon the quality and yield of the milk.

The simple fact seems to be that when animals are fed a particular food that is adapted to their needs these minor differences in the method of treating the ration have little influence. And this experiment shows that unchopped food has a feeding value equal to the chopped, and is just as palatable.

Road Repair.

In these days of hard times, when everyone is complaining of business being dull, and the times slow, we should not be idle and like the unfortunate Micawber wait for something to turn up, but we, as farmers, should take advantage of the dull times to provide ourselves with such things as will be most useful to us when business picks up again. Now, I do not care to enter into a discussion of crops, prices and the political outlook; that is not what I am going to speak of at all, but something more insignificant at first thought, more significant on further thought, and of the utmost importance to the followers of the plow. What I am going to speak of is, in short, good roads. A weighty subject you will say; yes it is, and a very important one, too. For success with the farmer in every way depends vastly upon the facilities which he has of getting his crops and produce to the best markets. It always seemed strange to me that farmers (and other people, too) would be content to ride and drive over mud roads where there is plenty of good road material in the neighborhood. And stranger still, that those in authority in any region should not take some action in getting the people organized into some movement for better roads.

The wheelmen and bicycle riders of the country are quite influential in the movement for better roads. For to them more than to the farmer and driver is the condition of the roads of much consequence.

On riding over the National road during the past summer I was struck with the excellent condition of it, after a season of heavy rainfall. This was a case in which the early preparation of the road showed its effect. This road might well be made an example by the people of many parts of the country. During the times when this road was the great thoroughfare for the Western trade its condition was even better than it is at present. It was made and re-

paired with broken stone, as the macadam roads are made today. The road was divided up into sections of a certain size and each section had an overseer or man to see to its repairs. The provisions for drainage are good and with the solid roadbed resulting from its early use have yet an exceptionally fine pike.

The first attention in road building should be to the drainage. This is of great importance, because you cannot have a good, solid, dry roadway without provisions for carrying off the surplus water. In building macadam roads a tile drain along the middle of the roadbed or one on each side answer the purpose. Attention should also be paid to the width of the road. Narrow roads are a nuisance. They are better than none, to be sure, but there is no excuse for them in a level country where there is plenty of material.

In getting the material for the road care should be taken that no clay or dirt is brought in with the gravel. This makes a sticky and slippery road. The layer of earth overlying the gravel should always be taken off before the gravel is taken down, as it is impossible to separate it then.

Puddles should never be allowed to stand in the road in any place. They only become larger and deeper by age and travel. The roadmen should go over the roads, after a rain for instance, and give an outlet to every place where water stands. This may seem at first a needless expense and trouble, but it will pay you in the end.

Lieutenant Edward Sigerfoos, '92, has completed the year's work at the United States arsenal, Springfield, Mass. He is at present spending a short vacation at his old home, Arcacum, Ohio, but will join his regiment at Fort McPherson, Atlanta, Ga., not later than November 1.

DON'T forget to send in your subscription to THE STUDENT.